

67,200-418
2000-0696

computer systems are often essential in the art of microelectronic fabrication for assisting in efficiently and effectively fabricating microelectronic fabrications, computer systems are nonetheless not entirely without problems in the art of microelectronic fabrication when employed for functions directed towards fabrication of microelectronic fabrications. In that regard, it is often difficult in the art of microelectronic fabrication to upgrade computer systems which are employed for purposes directed towards fabrication of microelectronic fabrications, with minimal disruption of the microelectronic fabrication functions which they support.

005 It is thus desirable in the art of microelectronic fabrication to provide methods, apparatus and systems which allow for upgrading of computer systems within microelectronic fabrication facilities, with minimal disruption to the microelectronic fabrication functions which they support within the microelectronic fabrication facilities.

006 It is towards the foregoing object that the present invention is directed.

007 Various methods, apparatus and systems have been disclosed in the arts not necessarily related to microelectronic fabrication arts for upgrading computer systems with minimal disruption to functions which the computer systems support within the arts not necessarily related to the microelectronic fabrication arts.

67,200-418
2000-0696

device to the new software within the first transaction service device, prior to returning the first transaction service device to service within the redundant transaction service system).

009 Desirable in the art of microelectronic fabrication are methods, apparatus and systems which allow for upgrading of computer systems within microelectronic fabrication facilities, with minimal disruption of the microelectronic fabrication functions which they support within the microelectronic fabrication facilities.

0010 It is towards the foregoing object that the present invention is directed.

SUMMARY OF THE INVENTION

0011 A first object of the present invention is to provide a method for upgrading a computer system employed within a microelectronic fabrication facility and a system for upgrading the computer system employed within the microelectronic fabrication facility.

0012 A second object of the present invention is to provide a method and a system in accord with the first object of the present invention, wherein the method and the system provide that the computer system is upgraded while minimally disrupting microelectronic fabrication functions which the computer system supports within the microelectronic fabrication facility.

67,200-418
2000-0696

0013 A third object of the present invention is to provide a method and a system in accord with the first object of the present invention and the second object of the present invention, wherein the method and the system are readily commercially implemented.

0014 In accord with the objects of the present invention, there is provided by the present invention a method for upgrading a computer system and a system for upgrading the computer system.

0015 To practice the method of the present invention, there is first provided a computer system having associated therewith an upgrade management utility, where the upgrade management utility provides for a buffering of a series of incoming requests to the computer system when upgrading the computer system while operating the computer system, to thus provide an uninterrupted idle state when upgrading the computer system when operating the computer system. There is then executed the upgrade management utility when operating the computer system to effect the uninterrupted idle state. There is then upgraded the computer system while in the uninterrupted idle state to provide an upgraded computer system, while simultaneously accumulating a series of buffered incoming requests to the computer system. Finally, there is then terminated the upgrade management utility after upgrading the computer system while in the uninterrupted idle state and released the series of buffered incoming requests for operation within the upgraded computer system.

0016 The method for upgrading the computer system in accord with the present invention contemplates a system employed for upgrading the computer system in accord with the present invention.

0027 Although the present invention and the preferred embodiment of the present invention provide particular value within the context of upgrading a computer system which is employed within a microelectronic fabrication facility, and in particular within a semiconductor integrated circuit microelectronic fabrication facility, the present invention is not in particular so limited. Rather the present invention may be employed for upgrading computer systems employed within facilities including but not limited to chemical fabrication facilities, mechanical fabrication facilities and electrical fabrication facilities.

0029 As is illustrated in Fig. 1, and in accord with the block of text which corresponds with reference numeral 10, there is first provided within the context of the present invention a computer system having associated therewith an upgrade management utility.

67,200-418
2000-0696

0030 Within the preferred embodiment of the present invention with respect to the computer system, the computer system is typically and preferably, although not necessarily exclusively, a computer system whose operation is desired to be minimally disrupted incident to upgrading of components within the computer system. Similarly, typically and preferably, the computer system is a computer system whose operation is generally not desired to be interrupted or disrupted under any circumstances during its operation, and whose operation is generally desired to be continuous. Thus, typically and preferably, but not exclusively, the present invention is more likely to be applicable to more powerful computer systems, such as but not limited to main frame computer systems, mid range computer systems and server computer systems, in comparison with less powerful computer systems, such as but not limited to client computer systems and personal computer systems.

0031 Within the preferred embodiment of the present invention with respect to the upgrade management utility, the upgrade management utility provides for a buffering of a series of incoming requests to the computer system when upgrading the computer system while operating the computer system, to thus provide an uninterrupted idle state when upgrading the computer system when operating the computer system.

0032 As will be discussed in greater detail below, to realize the foregoing object, the upgrade management utility will typically and preferably be initiated by a command, instruction or action of a party who desires to upgrade a particular computer system.

0033 With respect to the association of the upgrade management utility and the computer system, and although it is generally preferable within the present invention that the upgrade management utility be closely associated with or resident within the computer system which is desired to be updated in accord with the present invention, such in general is not required within the present invention. Rather, the upgrade management utility may be provided in a computer system or a server which is adjunct to the computer system which is desired to be upgraded in accord with the present invention.

0034 Referring again to Fig. 1, and in accord with the block of text which corresponds with reference numeral 12, there is shown the next process step in accord with the present invention.

0035 As is illustrated within the block of text which corresponds with reference numeral 12, there is executed the upgrade management utility which is associated with the computer system to provide within the computer system the uninterrupted idle state.

0036 Within the present invention and the preferred embodiment of the present invention, the execution of the upgrade management utility will typically and preferably be provided by either the user of the computer system which is desired to be upgraded, or more typically and preferably, the supplier of an upgrade to the computer system which is desired to be upgraded or a party who is responsible for operation of the computer system which is desired to be upgraded.

67,200-418
2000-0696

0037 Referring again to Fig. 1, and in accord with the block of text which corresponds with reference numeral 14, there is shown the next process step in accord with the present invention.

0038 As is shown within the block of text which corresponds with reference numeral 14, there is upgraded the computer system while operating the computer system within the uninterrupted idle state as provided incident to execution of the upgrade management utility in accord with the block of text which corresponds with reference numeral 12, while simultaneously buffering a series of requests incoming to the computer system. The series of requests incoming to the computer system which have been buffered would have otherwise been forwarded to the computer system if the computer was not operating in the uninterrupted idle state as provided incident to execution of the upgrade management utility in accord with the block of text which corresponds with reference numeral 12.

0039 Within the present invention and the preferred embodiment of the present invention with respect to the upgrade to the computer system, and although within the present invention the computer system may be upgraded within the context of a software upgrade, a firmware upgrade or a hardware upgrade, the present invention is generally intended to be most useful, and most common, within the context of a software upgrade to the computer system.

0040 Within the present invention and the preferred embodiment of the present invention with respect to the buffering of the series of requests incoming to the computer system while the computer system is operating in the uninterrupted idle state, the series of requests incoming to the computer system may be buffered

0041 Within the preferred embodiment of the present invention with respect to the uninterrupted idle state, the uninterrupted idle state is necessarily of a duration adequate to upgrade the computer system, but not of a duration such that there is compromised or unnecessarily disrupted any of several functions which the computer system might support.

0043 In accord with the block of text which corresponds with
reference numeral 16, once having upgraded the computer system
while operating within the uninterrupted idle state there is
terminated the upgrade management utility.

12

0049 As is illustrated within the schematic diagram of Fig. 2, the upgrade server is connected with each of the upgrade management utilities for purposes of effecting and managing an upgrade in software within each of the computer systems, as provided through a network which connects the upgrade server with the series of upgrade management utilities and the series of computer systems. The network may be a hard wired network or a wireless network, but most typically and preferably, within the context of the preferred embodiment of the present invention, the network is employed within a microelectronic fabrication facility for purposes of supporting microelectronic fabrication functions.

0050 Referring now to Fig. 3, there is shown a schematic diagram illustrating an alternative computer system which may be upgraded in accord with the present invention.

0051 As is illustrated within the schematic diagram of Fig. 3, a single computer system APx having associated therewith a single upgrade management utility Udx is sequentially upgraded three times while employing a single upgrade server, designated as Upgrade Server X.

0052 As is understood by a person skilled in the art, while the schematic diagram of Fig. 3 illustrates the upgrade server as having a connection to the computer system rather than the upgrade management utility, such is not necessarily intended to suggest that there necessarily exists a difference in mechanism through which the upgrade server within either Fig. 2 or Fig. 3 operates in

67,200-418
2000-0696

order to ultimately upgrade the series of computer systems as illustrated in Fig. 2 or the single computer system as illustrated in Fig. 3.

0053 Within the context of simultaneously upgrading a series of computer systems in accord with Fig. 2 or successively upgrading a single computer system in accord with Fig. 3, the upgrade server will in a first instance have contained therein an upgraded version of a software program which is desired to upgrade an operating version of the software program operating within the series of computer systems as illustrated within Fig. 2 or the single computer system as illustrated within Fig. 3.

0054 To effect the foregoing result, a series of actions, as follows, may be undertaken in accord with the present invention, although other series of actions may also be in accord with the present invention.

0055 First, the upgrade server may send a system upgrade signal to the computer systems operating under an older version of the software program. The system upgrade signal may in turn trigger the computer systems to prepare for a software upgrade by setting a series of upgrade flags and triggering the upgrade management utilities.

0056 Next, after the upgrade management utilities have been started, they may wait for the computer systems operating under the older version of the software program to execute any outstanding requests prior to entering into an uninterrupted idle state. Similarly, incident to setting the upgrade flags, a series of

67,200-418
2000-0696

request buffering procedures may be initiated such that incoming requests are buffered during the uninterrupted idle state. In addition to buffering the incoming requests, and depending upon the nature and extent of the computer systems upgrade, there may also be saved a series of image files of the computer systems outputs in addition to buffering the series of incoming requests to the computer systems.

0057 Next, the computer systems operating under the older version of the software program forward to the upgrade management utilities a series of upgrade ready signals and then terminate themselves.

0058 Next, the upgrade management utilities after having received the upgrade ready signals will start the upgraded version of the software within each of the computer systems in an upgrade start mode and then terminate themselves.

0059 Next, the upgraded versions of the software will install and self-test within each of the computer systems since they are being installed and started in the upgrade start mode.

0060 Finally, the upgraded versions of the software will restore any video images which were saved and archived incident to upgrading the computer systems, and request release of the series of buffered incoming requests to the computer systems. Incident to restoration of the video images and release of the buffered incoming images, the series of upgrades is complete.

67,200-418
2000-0696

0061 Upon practicing the invention as disclosed within the Description of the Preferred Embodiment, there is provided by the present invention a method for upgrading a computer system employed within a microelectronic fabrication facility and a system for upgrading the computer system employed within the microelectronic fabrication facility, wherein the computer system is upgraded while minimally disrupting functions which the computer system supports within the microelectronic fabrication facility.

0062 The present invention realizes the foregoing object by employing within the method for upgrading the computer system and the system for upgrading the computer system an upgrade management utility which provides for a buffering of a series of incoming requests to the computer system when upgrading the computer system while operating the computer system, to thus provide an uninterrupted idle state when upgrading the computer system when operating the computer system.

0063 As is understood by a person skilled in the art, the preferred embodiment of the present invention is illustrative of the present invention rather than limiting of the present invention. Revisions and modifications may be made to components and operations through which is provided a method in accord with the preferred embodiment of the present invention and a system in accord with the preferred embodiment of the present invention, while still providing a method in accord with the present invention and a system in accord with the present invention, further in accord with the accompanying claims.